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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte LLOYD D. CLARK, JR., JOSEPH M. STEINER, JR., SUZANNE D. RICHARDSON, RAMON HERNANDEZ-MARTI, TERRY L. MAYHUGH, BART J. BOMBAY, JOHN A. BOOKER and GILBERT R. MARTINEZ

Appeal 2009-000528
Application 09/471,659
Technology Center 2600

Decided: March 31, 2010

Before ROBERT E. NAPPI, KENNETH W. HAIRSTON, and JOSEPH F. RUGGIERO, *Administrative Patent Judges*.

DECISION ON APPEAL

This is an appeal under 35 U.S.C. §§ 6(b) and 134 from the final rejection of claims 2 to 9, 12 to 14, 16, 17, 20 to 26, and 28 to 53. We will reverse.

The disclosed invention relates to a well-logging telemetry system and method that has a downhole telemetry cartridge and an uphole telemetry unit

connected via a wireline cable. The telemetry data from the downhole telemetry cartridge is transmitted to a receiver in the uphole telemetry cartridge as analog signals on a plurality of carrier frequencies. The downhole transmitter has transmission power control circuitry that controls transmission power applied to the wireline cable in response to an adjustment signal transmitted from the uphole telemetry unit (Figs. 1-4; Spec. 3, 4, 6-13, and 25).

Claim 8 is representative of the claims on appeal, and it reads as follows:

8. A telemetry system for transmitting well-logging data from at least one downhole tool to a surface data acquisition system, the at least one down hole tool having a first tool data input/output interface, the telemetry system comprising:

a. a downhole telemetry cartridge connected to the at least one downhole tool via a second tool data input/output interface connected to the first tool data input/output interface, wherein the downhole telemetry cartridge receives a bitstream from the at least one downhole tool over the second input/output interface and comprising:

a transmitter connected to the second tool data input/output interface, and having a logic operable to cause transmission of the bitstream as analog signals on a plurality of carrier frequencies to an uphole telemetry unit connected to the downhole telemetry cartridge by a wireline; and

a cable driver having transmission power level control circuitry having logic to control the transmission power to optimize the total transmission power applied to the wireline cable in response to a received

adjustment signal transmitted to the downhole telemetry cartridge from the uphole telemetry unit and wherein the adjustment signal is a function of cable length, cable material, cable temperature, and cable geometry;

b. wherein the uphole telemetry unit is further connected to the surface data acquisition system via an acquisition computer interface and comprising a receiver connected to the surface data acquisition system and having logic operable to receive the analog signals on the plurality of carrier frequencies, to demodulate the received signals into a bitstream, and to output the bitstream to the acquisition computer via the acquisition computer interface;

overall power setting logic to measure the received signal amplitude and, in response to the measure of the received signal amplitude, to transmit the adjustment signal to the downhole telemetry cartridge; and

logic to cause the overall power setting logic to be executed prior to determining bits-per-carrier and power-level per carrier; and

c. a wireline cable providing an electrical connection between the downhole telemetry cartridge and the uphole telemetry unit, wherein the analog signals are transmitted in an uphole direction on the wireline cable.

The prior art[1] relied upon by the Examiner in rejecting the claims on appeal is:

Gardner	US 5,365,229	Nov. 15, 1994
Van Kerckhove	US 5,812,599	Sep. 22, 1998

[1] The filing dates/effective filing dates of the applied references are presumed to be prior to the filing date of the subject application.

Bae	US 5,832, 387	Nov. 3, 1998
Baird	US 6,469,636 B1	Oct. 22, 2002
Cioffi	US 6,473,438 B1	Oct. 29, 2002
Isaksson	US 6,493,395 B1	Dec. 10, 2002
Matsumoto	US 6,522,731 B2	Feb. 18, 2003
Bremer	US 6,647,058 B1	Nov. 11, 2003

The Examiner rejected claims 8, 13, 20, and 30 under 35 U.S.C. § 103(a) based upon the teachings of Gardner, Isaksson, and Bremer.

The Examiner rejected claims 2 to 7, 9, and 42 to 44 under 35 U.S.C. § 103(a) based upon the teachings of Gardner, Cioffi, and Baird.

The Examiner rejected claim 12 under 35 U.S.C. § 103(a) based upon the teachings of Gardner, Cioffi, and Isaksson.

The Examiner rejected claims 14, 16, 17, 21 to 25, 28, 29, 31 to 35, 37 to 41, 48, and 51 to 53 under 35 U.S.C. § 103(a) based upon the teachings of Gardner, Matsumoto, and Cioffi.

The Examiner rejected claims 26, 45 to 47, 49, and 50 under 35 U.S.C. § 103(a) based upon the teachings of Gardner, Bae, and Cioffi.

The Examiner rejected claim 36 under 35 U.S.C. § 103(a) based upon the teachings of Gardner, Bae, Cioffi, and Van Kerckhove.

Turning first to claims 8, 13, 20, and 30, Gardner describes a well-logging telemetry system that uses Digital Signal Processing (DSP) techniques to provide digital communication over the wireline logging cable (Fig. 1; Abstract).

The Examiner acknowledges:

> Gardener et al. does not disclose the apparatus having logic operable to cause transmission of the bitstream as analog signals on a plurality of carrier frequencies and logic operable to receive the analog signals on the plurality of carrier frequencies and optimizing the . . . total transmission power applied to the wireline in response to a received adjustment signal transmitted from the uphole telemetry unit wherein the adjustment signal is a function of cable length, cable material, cable temperature, and cable geometry; wherein the uphole telemetry units [sic] includes logic . . . to repeatedly measure the received signal amplitude and to transmit the received adjustment signal in response to the measurment [sic] to the downhole telemetry cartridge.

(Final Rej. 5)

According to the Examiner:

> However, Isaksson et al. discloses logic (Fig. 4, column 7, lines 5-19) operable to cause transmission (Fig. 4, Transmitter) of the bitstream as analog signals (multi-level pulses) on a plurality of carrier frequencies and logic (Fig. 4, Receiver) operable to receive the analog signals (multi-level pulses) on the plurality of carrier frequencies by the use of DMT modulation and logic to control. DMT modulation causes transmission of the bitstream as analog signals on a plurality of carrier frequencies.

(Final Rej. 5)

Based upon the teachings of Isaksson, the Examiner concludes (Final Rej. 5) that it would have been obvious to one of ordinary skill in the art "to modify

the transmitter and receiver of Gardener et al. with the transmitter and receiver logic of Isaksson et al. since Isaksson et al. states DMT modulation handles frequency dependent loss and noise in cables in an efficient manner and also provides high bit rate traffic over the cables (column 1, lines 14-23 and column 7, lines 5-20)."

With respect to the claimed control of "the transmission power to optimize the total transmission power applied to the wireline cable in response to a received adjustment signal transmitted to the downhole telemetry cartridge from the uphole telemetry unit" that was found to be missing in the teachings of Gardner, the Examiner states:

> Bremer et al. further discloses optimizing a transmission power applied to a cable (DSL) by measuring the SNR (column 5, lines 38-41) of a signal transmitted through the transmission cable and comparing this measured SNR of the transmitted signal to a minimum SNR (see column 6, lines 1-15). The comparison is then used to generate a power control signal (see column 6, lines 1-15) as function of cable noise which can be caused by the length/geometry of the cable (see column 2, lines 35-38) and cable (copper) material (see column 1, lines 49-51), wherein the power control signal is transmitted to the transmitter used to adjust the signal power level of the transmitted signal before it is transmitted though [sic] the transmission cables (column 6, lines 1-15). The power control can be used in a DMT system absent any bits-per-carrier of power-level-per carrier adjustment (see column 10, lines 1-10).

(Final Rej. 5, 6)

In view of the teachings of Bremer, the Examiner concludes (Final Rej. 6) that it would have been obvious to one of ordinary skill in the art to modify

the Gardner and Isaksson system with the transmission power control teachings of Bremer "since Bremer et al. states the transmission power control can optimize the transmission cable length used in the system (see column 10, lines 18-20)."

Appellants argue *inter alia* (App. Br. 33) that "*Gardner's* telemetry systems were not confronted with frequency dependent loss and noise" and "[t]hus, it is not logical that a person of ordinary skill in the art would be motivated to combine these references on the notion that *Isaksson* et al. states DMT modulation handles frequency dependent loss and noise in cables in an efficient manner and also provides high bit rate traffic over the cables because that was not a problem faced in *Gardner*.

In response, the Examiner contends (Ans. 38) that "[e]ven though Gardener discloses using a 'single carrier[,]' there is still noise applied to this carrier frequency through the cable."

Based upon the foregoing, we have to determine whether the Examiner erred by finding that it would have been obvious to the skilled artisan to apply the frequency dependent loss and noise teachings of Isaksson and the transmission power control teachings of Bremer to the well-logging telemetry system teachings of Gardner.

Although Isaksson recognizes (col. 7, ll. 5-7) that "[a] multi-carrier modulation technique, such as DMT, handles frequency dependent loss and noise in twisted pair-cables in an efficient manner," we agree with the Appellants' argument (App. Br. 33) that Isaksson is a solution to a nonexistent problem in the single carrier, digital wireline logging cable communication technique used by Gardner. Although Bremer recognizes

(col. 1, ll. 49-51; col. 2, ll. 23-42; col. 6, ll. 1-15; col. 10, ll. 1-17; Abstract) that the variables of transmission power level and data rate are affected by and are adjusted based on the signal to noise ratio in a DSL copper based communications system using DMT, we agree with Appellants' arguments (App. Br. 33-38) that the non-existent noise problem in Gardner would not have required the transmission power level control teachings of Bremer.

In summary, the Examiner erred in finding that the skilled artisan would have applied the frequency dependent loss and noise teachings of Isaksson and the transmission power control teachings of Bremer to the well-logging telemetry system teachings of Gardner. Thus, the obviousness rejection of claims 8, 13, 20, and 30 is reversed because we agree with Appellants conclusion (Reply Br. 8) that the Examiner's articulated reasons for modifying the teachings of the reference to Gardner with the teachings of Isaksson and Bremer do not support a legal conclusion of obviousness. *KSR Int'l v. Teleflex, Inc.*, 550 U.S. 398, 418 (2007).

Turning next to claims 2 to 7, 9, and 42 to 44, the Examiner indicates (Final Rej. 10, 11) that it would have been obvious to one of ordinary skill in the art to modify Gardner with the DMT data transmission teachings of Cioffi (col. 1, ll. 21-25; Abstract) and the wireline well-logging telemetry system "power transmission modes (eigenmodes)" teachings of Baird (col. 5, l. 1 - col. 6, l. 16) to avoid or compensate for the noise problem in Gardner. As indicated *supra,* and as repeated by Appellants (App. Br. 39), it would not have been obvious to the skilled artisan to modify the teachings of Gardner with those of Cioffi and Baird because noise and distortion are nonexistent problems in the single-carrier system described by Gardner. For

this reason, the obviousness rejection of claims 2 to 7, 9, and 42 to 44 is reversed.

The obviousness rejection of claim 12 is reversed because the non-existent noise and distortion problem in Gardner is not in need of a fix via the noise/distortion avoidance and compensation teachings of Cioffi and Isaksson as indicated *supra* (App. Br. 42).

Turning next to claims 14, 16, 17, 21 to 25, 28, 29, 31 to 35, 37 to 41, 48, and 51 to 53, we agree with the Examiner (Final Rej. 16, 17) that Matsumoto describes the use of a constellation encoder 67 and DMT modulation, but such teachings do not cure the noted shortcomings in the teachings of Gardner and Cioffi. Accordingly, the obviousness rejection of these claims is reversed.

The obviousness rejection of claims 26, 45 to 47, 49, and 50 is reversed because the Examiner's reasoning does not have a rational underpinning to support a conclusion of obviousness of the specifically claimed well-logging telemetry system training sequence based upon the teachings of Gardner, Cioffi, and the subchannel power level teachings of Bae (Abstract).

The obviousness rejection of claim 36 is reversed because the bits per carrier and power level teachings of Van Kerckhove (col. 11, l. 20 – col. 13, l. 39) do not cure all of the noted shortcomings in the teachings of Gardner, Bae, and Cioffi.

The decision of the Examiner is reversed.

REVERSED

KIS

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